

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, DC 20554

**RECEIVED**

SEP 10 2001

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

In the Matter of )

Service Rules For The Point-to-Point )  
Use Of The 71.0-76.0 GHz )  
and 81.0-86.0 GHz bands )

\_\_\_\_ Docket No. \_\_\_\_\_

To: The Commission

**PETITION FOR RULEMAKING**

Respectfully submitted,

**LOEA COMMUNICATIONS CORPORATION**

Paul G. Madison  
David C. Kirschner  
**KELLEY DRYE & WARREN LLP**  
1200 19<sup>th</sup> Street, NW  
Suite 500  
Washington, DC 20036  
(202) 955-9600 (telephone)  
(202) 955-9792 (facsimile)

Attorneys for Loea Communications Corporation

Lou Slaughter  
**LOEA COMMUNICATIONS CORPORATION**  
3038 Aukele Street  
Lihue, Kauai, HI 9676.06

Thomas Cohen  
**THE KDW GROUP LLC**  
1200 19<sup>th</sup> Street, NW, Suite 500  
Washington, DC 20036

Date: September 10, 2001

No. of Copies rec'd 01-9  
List ABCDE

0ET

01-274

## TABLE OF CONTENTS

Summary .....	ii
I. Introduction .....	2
II. Loea .....	3
A. Company Background .....	3
B. Loea's Hawaii Experiment .....	4
III. The Need for Gigabit Wireless Access .....	5
IV. Proposal For The Use Of The 71.0-76.0 GHz And 81.0-86.0 GHz Bands .....	8
A. The Nature Of Upper Millimeter Wave Spectrum .....	8
B. Availability Of The 71.0-76.0 GHz And 81.0-86.0 GHz Bands .....	8
C Regulatory Framework and Service Rules .....	9
1. <i>The Point-To-Point Use Of The 71.0-76.0 GHz And 81.0-86.0 GHz Bands             Should Be Regulated Under A Modified Part 101</i> .....	9
2. <i>Band Plan</i> .....	10
3. <i>Technical Considerations</i> .....	11
(i) <i>The Bands Should Not Be Divided or Channelized</i> .....	11
(ii) <i>Restrictions On Total Radiated Power And Antenna Directionality Are                 Needed To Ensure That Multiple Providers Can Share The 71.0-76.0                 GHz And 81.0-86.0 GHz Bands</i> .....	14
4. <i>Licensing</i> .....	14
(i) <i>Authorizations Required</i> .....	14
(ii) <i>Coordination And Application Process</i> .....	16
(iii) <i>Auctions are Neither Necessary Nor Appropriate for the 71.0-76.0                 GHz and 81.0-86.0 GHz Bands</i> .....	17
(iv) <i>The Commission Should Not Adopt Geographical-Area Licensing for                 These Bands</i> .....	19
V. Conclusion .....	21

## Summary

Loea Communications Corporation (“Loea”), by its attorneys and pursuant to 47 C.F.R. §§ 157 and 1.401, hereby petitions the Federal Communications Commission to commence a rulemaking proceeding to adopt service rules governing the licensing and point-to-point use of the 71.0-76 GHz and 81.0-86 GHz spectrum bands. The establishment of service rules for the 71.0-76 GHz and 81.0-86 GHz bands will allow a rapid deployment of gigabit-per-second broadband capacity in areas where fiber optic cables will not be deployed. These rules will also foster the development of innovative fixed wireless applications and services, create a powerful tool to help bridge the digital divide, and ensure that the United States stands in a leadership position in the markets for Upper Millimeter Wave communications services and technology.

Because of the unique nature of the propagation of the Upper Millimeter Wave bands, which originate as directional pencil-sized beams, multiple services and applications can be implemented without interference concerns, obviating the need to authorize this spectrum on the basis of scarcity. The limited regulation needed to ensure efficient use of these bands can be achieved by the addition of 71.0-76 GHz and 81.0-86 GHz to the spectrum authorized under Part 101 of the Commission’s Rules and by the establishment of simple bandwidth etiquette and technical standards.

Initial testing of this technology has met with great success. Using highly-directional dish antennas and transceivers transmitting to a receiver 1.7 miles away, the narrow beam translates to an illuminated footprint extending only 28 feet radially from the receiving antenna. When a second dish antenna is placed within this radius at the remote hub, the new dish reuses the spectrum without interference, simply by pointing the antenna 5 degrees away.

The rapid growth of the Internet has increased the need for broadband access, typically provided using optical fiber. But fiber capacity is not likely to reach deeply into suburban and rural areas because of the high cost of deploying fiber. Loea's proposed use of the 71.0-76 GHz and 81.0-86 GHz bands has the capability to reach deeply into suburban and rural areas. Loea's broadband technology will supplement fiber optic systems by extending broadband access beyond the reach of currently available fiber.

The Upper Millimeter Wave Spectrum propagates in cohesive "beams" making them ideal for point-to-point communication services, because their narrow path makes interference unlikely. The 71.0-76 GHz and 81.0-86 GHz bands are unoccupied by incumbents. The Commission should regulate the 71.0-76 GHz and 81.0-86 GHz bands under Part 101 of its rules, which govern point-to-point communications. The Commission already has vast experience with point-to-point licensing under Part 101; adding the 71.0-76 GHz and 81.0-86 GHz bands to Part 101 will provide certainty to end users, equipment developers, investors, and the FCC, and will lower the cost of authorizing this technology.

Providers seeking to use these bands should be authorized for the entire bandwidth, the bands should not be channelized, but to ensure that multiple users can share these bands, the Commission must enact restrictions on the total radiated power and the antenna directionality. Some form of FCC authorization is necessary to give investors and customers confidence in the service provider's permission to use the spectrum. Auctions are not appropriate because these spectrum bands can be used by multiple providers without interference. Geographic area licensing is similarly unnecessary. This Petition presents the Commission with the opportunity to authorize service rules which would allow the provision of wireless broadband capacity to consumers underserved by current technology, and therefore serves the public interest.

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

In the Matter of	)	
	)	
Service Rules For The Point-to-Point	)	___ Docket No. _____
Use Of The 71.0-76.0 GHz	)	
and 81.0-86.0 GHz bands	)	

To: The Commission

**PETITION FOR RULEMAKING**

Loea Communications Corporation (“Loea”), by its attorneys and pursuant to 47 C.F.R. §§ 157 and 1.401, hereby petitions the Federal Communications Commission (“Commission” or “FCC”) to commence a rulemaking proceeding to adopt service rules governing the licensing and point-to-point use of the 71.0-76.0 GHz and 81.0-86.0 GHz spectrum bands. The establishment of service rules for the 71.0-76.0 GHz and 81.0-86.0 GHz bands will be an important step in creating gigabit-per-second wireless broadband capacity. Moreover, it will allow a virtually unlimited number of providers to create and offer terrestrial wireless broadband services and applications. For the public, it will mean a rapid and wider deployment of broadband capacity, the development of new and innovative fixed wireless applications and services, the creation of a powerful tool in the struggle to make broadband capacity to all Americans, and ensure that the United States stands in a leadership position regarding Upper Millimeter Wave communications services and technology.<sup>1</sup>

---

<sup>1</sup> For purposes of this Petition, the “Upper Millimeter Wave” bands are the 71.0-76.0 GHz and 81.0-86.0 GHz bands and more generally the spectrum between 70 GHz and 100 GHz.

## I. Introduction

The Commission's stated goal is "to pursue policies that promote competition and encourage the development of emerging telecommunications technologies."<sup>2</sup> In the fulfillment of this policy, establishment of rules for the point-to-point use of 71.0-76.0 GHz and 81.0-86.0 GHz bands will allow the introduction of new technologies and services that take advantage of the unique propagation characteristics of the unused Upper Millimeter Wave spectrum. For business and consumers it means ***gigabit-per-second*** wireless broadband capacity in suburban and rural areas where fiber optic cables will not be deployed.<sup>3</sup>

The emerging technologies developed by Loea and others will bring innovative services to the virtually barren Upper Millimeter Wave spectrum and allow many providers to compete and to enter the marketplace at any time the market offers an opportunity to provide services to the public. In addition, because of the unique propagation characteristics of the Upper Millimeter Wave bands, which originate as directional pencil-sized beams, multiple services and applications can be developed and implemented without interference concerns. This obviates the necessity, as with other spectrum, to authorize this spectrum on the basis of scarcity.

The establishment of service rules for the 71.0-76.0 GHz and 81.0-86.0 GHz spectrum bands will fulfill the Commission's stated goals. First, it will provide the regulatory certainty needed to encourage the further development of cutting-edge telecommunications technologies. Second, regulatory certainty will allow for the rapid commercialization of these spectrum bands,

---

<sup>2</sup> *Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium*, Policy Statement, 14 FCC Rcd 19868, at ¶ 2 (1999).

<sup>3</sup> The use of Upper Millimeter Wave spectrum will also be useful in urban areas, particularly where delay has been encountered in fiber construction.

which will promote competition by offering consumers greater choice in fulfilling their telecommunications needs, especially in areas under-served by current technologies.

This regulatory certainty can be achieved by the addition of 71.0-76.0 GHz and 81.0-86.0 GHz to the spectrum that may be authorized under Part 101 of the Commission's Rules and the establishment of simple bandwidth etiquette and technical standards. As proposed in this Petition, the changes to Part 101, and the services provided over the 71.0-76.0 GHz and 81.0-86.0 GHz spectrum, would be flexible enough to allow other and future services and applications, whether authorized under Part 101 or a separate allocation and licensing scheme.

## **II. Loea**

### **A. Company Background**

Loea is a subsidiary of Trex Enterprises Corporation ("Trex"). Established in 1978, Trex is headquartered in San Diego, California, has 150 employees, and has operating divisions in Hawaii, New Mexico, and Massachusetts. Trex specializes in Government and commercial research and development in the field of applied physics.

Trex is developing a wide variety of technologies, including passive millimeter-wave cameras; wind speed and wire strike sensors for helicopters; ground stations for imaging satellites in geo-stationary and low earth orbits; adaptive optical systems for large telescopes; bullet trackers for sniper detection; missile intercept optical tracking and imaging equipment; advanced application specific integrated circuits; CMOS active pixel sensors; and advanced materials for ceramic mirrors, semiconductor manufacturing and hardened machine tools. Trex's mission is to develop these leading-edge technologies, from space-based polar ozone monitoring systems to millimeter wave imaging systems that see through fog, smoke and haze, and turn them into useful and innovative products for society.

Trex, through Loea, is also applying its know-how, experience and research and development to the field of communications, initially by developing a wireless technology capable of providing 1.25 Gbps capacity over ten mile distances utilizing Upper Millimeter Wave spectrum. In the longer term, Loea is developing technology capable of providing 12.5 Gbps capacity.

#### **B. Loea's Hawaii Experiment**

The technology that Loea wishes to deploy in the Upper Millimeter Wave bands can be used to expand the broadband capacity of the fiber optic network to areas where installing fiber is too costly. Loea's equipment is capable of meeting the current Gigabit Ethernet standard of 1.25 Gbps of full-duplex data transmission. For the future, Loea is already working to develop equipment to reach a Gigabit Ethernet standard of 12.5 Gbps.

In July 2001, under experimental authority issued by the Commission, Loea began testing its technology by connecting its Maui headquarters in Kihei, Hawaii with its remote processing facility.<sup>4</sup> This remote site was outfitted to act as a hub for the distribution of broadband access, using the Outrigger Hotel on the Wailea shores as the first beta site and demonstrating Internet access, video on demand, and teleconferencing capabilities. The Loea experiment has met with great success.

In its Maui experiment, Loea used highly-directional millimeter-wave (MMW) dish antennas and low-noise amplitude-modulated transceivers. Using simple on-off keying, the links transmit and receive over separate channels at 71.00-72.75 and 73.00-74.75 GHz. Two feet in diameter, the dish antennas generate pencil-like beams only 0.36 degrees wide.

---

<sup>4</sup> Attached as Appendix A of this Petition is a paper entitled *Fixed Point-To-Point Operations in the 71.0-76.0 GHz and 81.0-86.0 GHz* (the "Lovberg Paper"). Authored by Dr. John Lovberg, this paper provides an overview of the technology Loea wishes to



In the testing, transmitting to a receiver 1.7 miles away, the narrow beam translates to an illuminated footprint extending only 28 feet radially from the receiving antenna. Even when a second dish antenna is placed within this radius at the remote hub, the new dish reuses the spectrum without interference, simply by pointing in a slightly different direction (in this case, less than 5 degrees away).

The narrow beam delivers 240 Watts ERP from only a 5 milliwatt transmitter. At 70 GHz, this power level provides reliable link performance through heavy fog and light rain, while the beam diameter is sufficiently large to be unaffected by the occlusions of birds or leaves.

Loea continues to successfully test the use of the Upper Millimeter Wave bands in Hawaii and plans further testing of its Upper Millimeter Wave application.

### **III. The Need for Gigabit Wireless Access**

The Internet and the growing ability to collect and manipulate data have increased the need for high-speed broadband access. Currently, this type of access is provided using optical fiber. The considerable capital expense of laying fiber has limited its deployment almost exclusively to densely populated metropolitan areas.<sup>5</sup> Fiber capacity is not likely to reach deeply into rural and suburban areas because the population density drops below the threshold needed for an adequate return on investment.

Unlike fiber, Loea's proposed use of the 71.0-76.0 GHz and 81.0-86.0 GHz bands has the capability to reach deeply into rural and suburban areas. This means that consumers will reap substantial benefit from the utilization of this spectrum. One immediate benefit will be that those

---

employ, describes the Hawaii experiment, and discusses certain technical aspects of the use of the 71.0-76.0 GHz and 81.0-86.0 GHz bands.

<sup>5</sup> See Appendix B at 5-6. Appendix B is a paper authored by A. Daniel Kelley, Ph.D., of HAI Consulting, Inc., entitled *Economically Efficient Licensing of the Millimeter Wave Band* (the "HAI Paper"). The HAI Paper supports Loea's proposal for the point-to-point utilization of the 71.0-76.0 GHz and 81.0-86.0 GHz bands.

who stand across the digital divide from broadband access will be provided a wireless broadband solution.

In addition, as detailed in the HAI Paper, the use of the 71.0-76.0 GHz and 81.0-86.0 GHz bands has the potential to satisfy unmet consumer demand.<sup>6</sup> HAI also predicts that, in fulfillment of the Commission's spectrum goals, Loea's proposal to establish services on the 71.0-76.0 GHz and 81.0-86.0 GHz bands will provide entrepreneurs with an opportunity to build new businesses based on innovation.<sup>7</sup> With the proper regulatory framework, market forces rather than government fiat will determine the success or failure of such innovations.<sup>8</sup>

Another important factor to consider is that point-to-point operations on the 71.0-76.0 GHz and 81.0-86.0 GHz bands will permit deployment on any scale, both small and large. This means that point-to-point use of the 71.0-76.0 GHz and 81.0-86.0 GHz bands as proposed by Loea will provide cost-effective broadband capabilities to businesses, schools, libraries and hospitals that have no or limited access to broadband capacity.<sup>9</sup> The scalability of the point-to-point use of the 71.0-76.0 GHz and 81.0-86.0 GHz bands will allow innovative applications and services not currently contemplated to be developed.<sup>10</sup>

Providing consumers with gigabit wireless access will put them on the same footing as consumers served by fiber optic rings installed in downtown business areas. For example, Loea's broadband technology will complement and supplement fiber optic systems by extending broadband access beyond the reach of currently available fiber. This Gigabit wireless access will enable businesses and other entities with similar broadband needs to locate outside of traditional

---

<sup>6</sup> *Id.* at 5.

<sup>7</sup> *Id.*

<sup>8</sup> *Id.*

<sup>9</sup> *Id.* at 7.

congested downtown areas and provide broadband access to those businesses, hospitals, schools, and libraries that already exist beyond the reach of the fiber loop.

Gigabit wireless access will advance other forms of wireless communications. For example, Loea's technology can be used to provide backhaul to cellular or Personal Communications Services ("PCS") towers that do not have access to fiber.<sup>11</sup> This will enable cell towers to provide greater capacity, a capacity that will certainly be needed with the advent of 3G and the consequent increased use and capacity demand that will be needed to provide the promises of 3G services.

Gigabit wireless access will further telemedicine by enabling doctors in rural hospitals to consult with hospitals around the country. Imagine a rural hospital using this broadband data capability in order to share X-rays and other patient information with specialists at the National Institute of Health or the Memorial Sloan-Kettering Cancer Center in New York City. That broadband access is contained in this Upper Millimeter Wave spectrum.

Gigabit wireless access will allow students in rural and suburban schools access to any resource available on the Internet. Imagine seniors in rural high schools taking college classes from a university located across the state or across the country.

Gigabit wireless access will also connect areas that are difficult to serve because of the terrain they are located in or urban areas where fiber implementation has been delayed.

Finally, by adopting the Loea proposal that the 71.0-76.0 GHz and 81.0-86.0 GHz bands be authorized under the existing Part 101 framework, deployment of services on these bands could begin immediately.<sup>12</sup>

---

<sup>10</sup> *Id.*

<sup>11</sup> *Id.* at 8.

<sup>12</sup> *Id.*

#### **IV. Proposal For The Use Of The 71.0-76.0 GHz And 81.0-86.0 GHz Bands**

##### **A. The Nature Of Upper Millimeter Wave Spectrum**

The use of Upper Millimeter Wave spectrum is a new and open frontier. This is due in part to the fact that this frequency space marks the limits of today's semiconductor technology.<sup>13</sup> Moreover, the propagation characteristics of this spectrum is also entirely unique from spectrum currently authorized for use by the Commission.

The Upper Millimeter Wave Spectrum propagates most effectively in "beams" that resemble laser beams.<sup>14</sup> This makes the Upper Millimeter Wave Bands ideally suited for highly directional point-to-point gigabit-per-second communication services.<sup>15</sup> In addition, because the Upper Millimeter Wave signals propagate most efficiently as pencil-sized beams, it would be extremely rare, if ever, that one provider would interfere with another provider.

When originated, the beams are pencil-sized beams and create a three dimensional "pipe" along a straight and narrow path. This means that interference among paths is not possible unless the beams are essentially directly aligned.<sup>16</sup> Moreover, an engineering solution as simple as realignment of the transmit or receive dishes would resolve any potential for harmful interference.<sup>17</sup>

##### **B. Availability Of The 71.0-76.0 GHz And 81.0-86.0 GHz Bands**

Currently, 71.0-75.5 GHz is allocated for *fixed* and mobile services on a co-primary basis for Federal Government and non-Federal Government use.<sup>18</sup> Under WRC-2000, the United

---

<sup>13</sup> Appendix A at 2.

<sup>14</sup> *Id.* at 5-6.

<sup>15</sup> *Id.* at 5.

<sup>16</sup> *Id.* at 5-6.

<sup>17</sup> *Id.*

<sup>18</sup> See 47 C.F.R. § 2.106.

States proposed the reallocation of 75.5-76.0 GHz for fixed and mobile services to facilitate commercialization of the Upper Millimeter Wave bands.<sup>19</sup> The current Section 2.106 allocation, in addition to the allocation proposed under WRC-2000, provides the spectrum necessary for point-to-point services in this 71.0-76.0 GHz band.<sup>20</sup>

Like the 71.0-75.5 GHz band, the 81.0-86.0 GHz band is already allocated for *fixed* and mobile services on a co-primary basis for Federal Government and non-Federal Government use.<sup>21</sup> As such, no allocation is necessary, the Commission need only adopt service rules to make the 81.0-86.0 GHz band available for point-to-point use.

The 71.0-76.0 GHz and 81.0-86.0 GHz bands appear to be completely unoccupied by incumbents. Because the Commission never issued service rules for these bands, non-Federal Government users have been unable to use these bands. Additionally, according to Loea's limited information, Federal Government users have not made use of these spectrum bands.

### **C. Regulatory Framework and Service Rules**

#### **1. *The Point-To-Point Use Of The 71.0-76.0 GHz And 81.0-86.0 GHz Bands Should Be Regulated Under A Modified Part 101***

The Commission should regulate the 71.0-76.0 GHz and 81.0-86.0 GHz bands under Part 101 of its rules.<sup>22</sup> As discussed above, these spectrum bands are ideal for point-to-point wireless communications systems. Because the Commission regulates such wireless systems under Part

---

<sup>19</sup> WRC-2000 will eliminate footnote S5.149 from Section 2.106 of the Commission's Rules. Footnote S5.149 requested that administrations take steps to protect radio astronomy service operations in the 72.77-72.91 GHz band. Although this footnote is to be eliminated, Loea believes that fixed point-to-point operations would have no impact on radio astronomy and that interference concerns could be resolved through appropriate coordination.

<sup>20</sup> To the extent necessary to provide the full 71.0-76.0 band for point-to-point use, Loea requests that the Commission adopt the appropriate portions of WRC-2000.

<sup>21</sup> See 47 C.F.R. § 2.106.

<sup>22</sup> See 47 C.F.R. §§ 101 *et. seq.* See generally, Appendix A at 7.

101, the Part 101 rules are ideally suited for regulating these new bands as well. Little more is required than adding the 71.0-76.0 GHz and 81.0-86.0 GHz bands to Part 101 to make them available for commercial use.

There are several reasons for using Part 101 to regulate fixed, point-to-point wireless systems in the 71.0-76.0 GHz and 81.0-86.0 GHz bands. First, a point-to-point implementation best fits the propagation characteristics of the band, *i.e.*, the energy attenuation in these bands is so great that only by using narrow radiating beams can longer distances (up to ten miles per path link) be covered.

Secondly, the Commission already has vast experience with point-to-point licensing under Part 101. Adding the 71.0-76.0 GHz and 81.0-86.0 GHz bands to Part 101 will put these services on familiar ground and provide greater certainty to end users, equipment developers, investors, and the FCC.

Finally, using the already existing regulatory paradigm of Part 101 will lower the cost of authorizing this technology, facilitate the rapid deployment of applications in this spectrum, and conserve valuable Commission resources.

## **2. Band Plan**

Loea proposes that the Commission authorize the use of the 71.0-76.0 GHz and 81.0-86.0 GHz bands for point-to-point services. Specifically, Part 101 of the Commission's Rules should be modified to include these bands.<sup>23</sup> Providers seeking to use these bands should be authorized for the entire bandwidth, allowing the spectrum to be utilized for a variety of services and applications.<sup>24</sup>

---

<sup>23</sup> 47 C.F.R. §§ 101 *et. seq.*

<sup>24</sup> Appendix C of this Petition contains a modified version of Section 101.109 that reflects the appropriate modifications.

### **3.      *Technical Considerations***

In order to ensure that the 71.0-76.0 GHz and 81.0-86.0 GHz bands can be used to meet gigabit-per-second access needs, the Commission should adopt service rules that do not prevent capable entities from providing this new service. Because Part 101 was designed to regulate fixed, point-to-point systems, most of the technical rules in Part 101 can be adopted or adapted to make it possible for many different entities to use the 71-76.0 GHz and 81-86.0 GHz bands. In order to provide gigabit wireless access to the Internet, however, the Commission must keep in mind that the propagation and attenuation characteristics of these bands are different from other spectrum bands regulated by Part 101, and the fact that this spectrum is not currently being used. The Commission must take these factors into consideration when adopting rules that will enable the provision of gigabit-per-second wireless access to the Internet.

To bring this use of 71.0-76.0 GHz and 81.0-86.0 GHz to fruition, a few Part 101 technical rules need to be amended. Appendix C hereto suggests the appropriate modifications. Below, Loea discusses the more important aspects of the technical parameters for use of the 71.0-76.0 GHz and 81.0-86.0 GHz bands.

#### ***(i)      The Bands Should Not Be Divided or Channelized***

To provide point-to-point access with sufficient throughput to meet local backhaul requirements beyond a three-year time horizon, a service provider will need to use all ten gigahertz of available spectrum in the 71.0-76.0 GHz and 81.0-86.0 GHz bands. For this reason, the Commission should not subdivide the bands into narrower channels.

By requiring point-to-point licensees to use very narrow “pencil beam” transmission, *i.e.*, highly-directional beams with high ERP but using little transmitter power, the Commission can allow entities to use all ten gigahertz of spectrum and still allow a limitless number of entities to share these bands. Because of the propagation and attenuation characteristics of these bands, a

service provider will have to use narrow beams in order to be able to provide service between two points more than a few kilometers apart. Focusing the transmitter power allows it to propagate further in any chosen direction, so equipment developers have a natural incentive to narrow their beam. The result will be the exclusive adoption of spatially small beams. For example, in its Hawaii tests, Loea used transmitters delivering only 30 milliwatts of power, but through the use of highly directional antennas it generates ERPs of up to 5 kW. In general, a high antenna gain multiplies a low transmitter power level, to produce a high ERP confined to a spatially narrow beam.

Because these beams are so narrow (typically less than 0.5 degrees), it is difficult to interfere with them. The only way to really interfere with such a beam is to point another beam from the same source location almost directly at the same target receiver.<sup>25</sup> Obviously, the chance to cause harmful interference is *de minimis*. As a result, a vast number of users and paths are possible, and little regulation is necessary. The only resource limitation is really a spatial limitation on the number of available paths. The ramifications of this extremely low likelihood of interference should be a basic tenet of the Commission's rulemaking for the Upper Millimeter Waveband fixed point-to-point systems.

With the low likelihood of interference, there is no impetus for the FCC to subdivide the 71-76.0 GHz and 81-86.0 GHz bands into channels. In the spectrum below 40 GHz, subdividing bands into channels and providing exclusive use of each channel is the only way to accommodate multiple users within a single geographical location. This is because propagation characteristics and the equipment being used below 40 GHz make it much more likely that users

---

<sup>25</sup>

Appendix A at 5-6.



would interfere with each other in those bands. For these reasons, the FCC has subdivided the bands below 40 GHz into channels, to enable multiple entities to use those bands.<sup>26</sup>

Leaving the 71.0-76.0 GHz and 81.0-86.0 GHz bands undivided provides equipment developers with the greatest amount of flexibility to design systems. For example, making two channels available with 5 GHz of contiguous bandwidth in each, makes possible a wireless technology capable of meeting the next “10-Gigabit Ethernet” standard, with its 12.5 Gbps data throughput requirement. It also enables wireless technology for today’s 1.25 Gbps standard. Conversely, subdividing the millimeter-wave bands into channels would simply and unnecessarily establish an upper limit on channel data throughput, and would thereby prevent commercial wireless entities from meeting future demands such as the next 10-Gigabit Ethernet standard, a standard that is only a few years away.

Normally a policy making available wide slices of contiguous bandwidth would result in a spectrum grab. However, there is little or no advantage to a spectrum grab here because new competitors can enter a geographical location at any time and connect new points without causing, or being effected by, harmful interference from existing service providers in the same location. As a result, it will not be possible to grab spectrum and prevent others from using it.

For the above reasons, the Commission should specify the maximum authorized channel bandwidth in Section 101.109(c) as 5,000 MHz, and not subdivide the spectrum available in the 71.0-76.0 GHz and 81.0-86.0 GHz bands into smaller channels. Subdividing these bands into channels would unnecessarily limit the use of these bands and prevent the offering of competitive gigabit wireless access.

---

<sup>26</sup> Dividing the bands limits their capacity but enables multiple users.

**(ii)     *Restrictions On Total Radiated Power And Antenna  
Directionality Are Needed To Ensure That Multiple Providers  
Can Share The 71.0-76.0 GHz And 81.0-86.0 GHz Bands***

To ensure that multiple users can share these bands without subdividing them into channels, the Commission must enact restrictions on the total radiated power and the antenna directionality. More specifically, adopting a maximum EIRP of +55 dBW is recommended in Part 101.113(a), in keeping with current limits on the 38,600-40,000 MHz band and several other microwave bands regulated pursuant to Part 101.<sup>27</sup>

To ensure that service providers use sufficiently narrow beams, the Commission should specify a minimum 50 dBi antenna gain and, consistently, a 0.6-degree half-power beamwidth (HPBW) for both Category A and Category B (congested and uncongested) areas. Instituting such a requirement will result in a gain that is 12 dB higher than other Part 101 regulated bands,<sup>28</sup> thus regulating the sharing of spectrum in these bands by spatially narrowing the beams being used to provision service.

**4.     *Licensing***

**(i)     *Authorizations Required***

Although there may be some point in the future when authorizations would be unnecessary in the 71.0-76.0 GHz and 81.0-86.0 GHz bands, currently some form of FCC authorization, *e.g.*, license or registration, is necessary. The reasons are simple and compelling. In order to sell their services, providers must be able to show that they have priority use of the spectrum,<sup>29</sup> here narrow spectrum pipes. In addition, to attract the investment capital to build viable businesses, providers must be able to show that they have acquired the necessary

---

<sup>27</sup>     See 47 C.F.R. § 101.113(a). Other bands with a maximum allowable EIRP include the 27,500-28,350 MHz, the 10,700-11,700 MHz, and the 5925-6425 MHz bands.

<sup>28</sup>     See 47 C.F.R. § 101.115(c).

authorization in the form of a license or registration that establishes a priority and right to use the spectrum.<sup>30</sup>

In the instant matter, licensing point-to-point links will obviate the possibility of harmful interference.<sup>31</sup> In turn, this will provide end users assurance that the provider will be able to deliver the promised reliability and quality of services. Without the reliability that comes with licensing, wireless gigabit providers will be at a disadvantage to other non-wireless providers because of the greater burden required to guarantee the same quality of service offered by competing services.

Licensing also provides the certainty demanded by *investors* so that *they* may evaluate the sufficiency of a provider's wireless network and may provide the capital necessary to develop the network. Without investment, commercialization of the Upper Millimeter Wave band could be significantly stunted. Licenses will establish for the provider, customer and investor a guarantee that, for licensed paths, the provider has priority interference-free use of that path. Providing licenses should help encourage investment in the licensees and manufacturers of the licensee's equipment. Therefore, to facilitate the commercialization of this spectrum, the Commission should adopt a point-to-point licensing scheme.<sup>32</sup>

---

<sup>29</sup> Appendix B, HAI Paper at 4.

<sup>30</sup> *Id.*

<sup>31</sup> The Commission currently licenses microwave spectrum above 2 GHz on a site-by site basis, and applicants are required to resolve interference issues prior to filing their application. As the Commission has stated, "under the current licensing scheme, mutually exclusive situations rarely, if ever, occur." In the Matter of Reorganization and Revision of Parts 1, 2, 21, and 94 of the Rules to Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Services, *Memorandum Opinion and Order and Notice of Proposed Rulemaking*, WT Docket No. 94-148, FCC 00-33 at ¶ 75 (Feb. 14, 2000).

<sup>32</sup> Appendix B, HAI Paper at 8.

**(ii) Coordination And Application Process**

The traditional way in which point-to-point microwave paths are licensed is that the proposal for path undergoes coordination to determine whether interference issues exist prior to filing an application for that path at the FCC. If interference is predicted, the proposal is modified at the coordination stage. Utilizing the Commission's ULS system, microwave path authorizations are quickly and efficiently licensed, modified and renewed.

Loea proposes that the Commission adopt the same or similar licensing framework for the 71.0-76.0 GHz and 81.0-86.0 GHz bands. Consistent with the necessity that providers are issued some form of authorization, the Commission could simply and effectively utilize the existing point-to-point licensing framework. As an alternative, if the Commission wished to reduce its licensing process burdens, it could delegate a significant portion of that process to an independent third-party coordinator such as the existing microwave coordinators.<sup>33</sup>

In the recent 700 MHz auction, the Commission auctioned the spectrum to "band managers" whose job it will be to make the spectrum available to third parties. The band manager concept is inapplicable to the proposed use of the 71.0-76.0 GHz and 81.0-86.0 GHz bands.<sup>34</sup> As discussed in the HAI Paper, attached at Appendix B, technological applications in the Upper Millimeter Wave band require "vertical slices" of spectrum reducing the number of viable spectrum managers.<sup>35</sup> In addition, giving the band manager exclusive use of the spectrum in a geographic area gives the band manager a monopoly in that area, which is harmful to potential providers and customer alike.<sup>36</sup> The 71.0-76.0 GHz and 81.0-86.0 GHz bands will be

---

<sup>33</sup> *Id.* at 14.

<sup>34</sup> As noted in the HAI Paper at 13-14, economists and Commissioner Powell have expressed reservations regarding the efficiency of band managers.

<sup>35</sup> *Id.* at 12.

<sup>36</sup> *Id.* at 13.

effectively managed by the marketplace and the most oversight needed in these bands is a streamlined coordination process that results in the issuance of a recognizable FCC authorization to utilize the spectrum.

**(iii) *Auctions are Neither Necessary Nor Appropriate for the 71.0-76.0 GHz and 81.0-86.0 GHz Bands***

Invariably, the Commission will consider whether the Upper Millimeter bands should be subject to competitive bidding. The Commission should not use auctions to award licenses in the 71-76.0 GHz and 81-86.0 GHz bands. Instead, as discussed above, a more appropriate approach involves adopting the simple and traditional Part 101 framework for licensing point-to-point paths in the Upper Millimeter Wave bands.

Since auctions are an efficient way of dealing with scarcity,<sup>37</sup> a threshold question is whether scarcity exists with respect to this spectrum. The answer to this question is that, for fixed point-to-point services, there is no scarcity of spectrum because mutual exclusivity will not exist. The point-to-point nature of these paths and the nature of propagation of the Upper Millimeter Wave bands provide an almost unlimited potential for carriers to provide point-to-point services.

It is significant to note that although the peace-of-mind that comes with priority rights and coordinated licenses will be important to attracting investment, actual service conflicts will be highly unlikely. This is a consequence of the fact that fixed point-to-point transmissions in the Upper Millimeter Wave bands will propagate as non-interfering pencil-beams. In this arena, reorientation or relocation of an antenna to eliminate harmful interference is measured in tenths of degrees or tens of meters. This means that it will always be possible to move or reorient an antenna to avoid harmful interference. Therefore, even if two entities want to provide service

---

<sup>37</sup> *Id.* at 8.

over the same path, harmful interference can be avoided by judiciously routing the second path around the first.

As discussed in the HAI Paper, despite their benefits, auctions do not always automatically increase consumer welfare.<sup>38</sup> For example, raising revenue for the US Treasury by artificially reducing the amount of spectrum available is not economically efficient. This revenue is in effect a tax that increases the amount consumers must pay for services and discourages investment.<sup>39</sup> This reduces the ability of new service providers to enter the market, impairs the Commission's ability to reach its spectrum goals, and makes it less likely that consumers will be able to enjoy a variety of innovative services at reasonable cost.<sup>40</sup>

Even if an incumbent service provider is operating thousands of point-to-point-licensed links within a certain city, a competitive service provider can enter the same market at any time with a better product, better pricing or both. This paradigm is enabled by the unique nature of signal transmission above 70 GHz, where the narrow radiating beams allow unlimited reuse of the frequency spectrum. This is the essence of competition and will result in lower costs to end users of wireless broadband services. Accordingly, there is no motivation for a competitive bidding process to select a licensee. Indeed, these bands are ideally suited to a less-constrained licensing requirement.

Finally, Section 309(j)(6) states that “[n]othing in this subsection [309(j)], or in the use of competitive bidding, shall... (E) be construed to relieve the Commission of the obligation in the public interest to continue to use engineering solutions, negotiation, threshold qualifications, service regulations, and other means in order to avoid mutual exclusivity in application and

---

<sup>38</sup> *Id.* at 9.

<sup>39</sup> *Id.*

<sup>40</sup> *Id.*

licensing proceedings.”<sup>41</sup> Here the Commission can avoid mutual exclusivity by using a simple coordination process. As such, Section 309(j)(6) of the Act mandates that the Commission employ coordination or other devices to avoid the potential for mutual exclusivity.

For these reasons, and the reasons set forth in the HAI Paper, auctioning this band is inappropriate. It would also prove to be counterproductive, delaying market entry and increasing the ultimate cost of service for consumers.

**(iv)     *The Commission Should Not Adopt Geographical-Area  
Licensing for These Bands***

The Commission should also not use geographic area licensing for these bands. Similar to other point-to-point microwave regulation, there is simply no reason to adopt such a licensing scheme. Indeed, adopting such a scheme would be contrary to the Commission’s goal of allowing several users to share spectrum.

As discussed above, fixed point-to-point systems operating in this band would use very narrow pencil-beams to transmit data. As a result of using such beams, the likelihood for interference would be extremely rare. Therefore, it is possible for many links to exist very near to each other.

Geographically licensing this spectrum would only succeed in keeping competing providers out of an area. The license becomes a tool to monopolize a geographical area. In this spectrum band it is simply not necessary and is counterproductive to the goal of encouraging maximum utility of the airwaves.

Because of the fixed point-to-point nature of the transmissions, geographic licensing is not appropriate and artificially creates scarcity. By authorizing the spectrum on a path-by-path basis a nearly infinite number of providers could be authorized to utilize this spectrum. The

---

<sup>41</sup> 47 U.S.C. § 309(j)(6)(E).

ability of multiple providers to become quickly authorized to utilize the spectrum will encourage the development of technology and provide for ease of competitive entry into this marketplace.

## **V. Conclusion**

This Petition presents the Commission with a truly unique opportunity. In an extremely short period, the Commission could authorize service rules under Part 101 that would allow the provision of wireless broadband capacity to those consumers facing the possibility of never acquiring such capacity. This opportunity is highly compelling because these innovative



services will be provided on spectrum that heretofore was considered to be unusable for commercial service. Further, because of the narrow-beam nature of the use of the spectrum, any number of providers may quietly enjoy the use of this spectrum without threat of harmful interference.

For all of the reasons stated in this Petition and its Appendices, Loea respectfully requests the FCC commence a rulemaking proceeding in accordance with the foregoing proposals.

Respectfully submitted,

**LOEA COMMUNICATIONS CORPORATION**

By: Paul G. Madison  
Paul G. Madison  
David C. Kirschner  
**KELLEY DRYE & WARREN LLP**  
1200 19<sup>th</sup> Street, NW  
Suite 500  
Washington, DC 20036  
(202) 955-9600 (telephone)  
(202) 955-9792 (facsimile)

Attorneys for Loea Communications Corporation

Lou Slaughter  
**LOEA COMMUNICATIONS CORPORATION**  
3038 Aukele Street  
Lihue, Kauai, HI 9676.06

Thomas Cohen  
**THE KDW GROUP LLC**  
1200 19<sup>th</sup> Street, NW, Suite 500  
Washington, DC 20036

Date: September 10, 2001